

(12) UK Patent Application (19) GB (11) 2 234 446 (13) A (43) Date of A publication 06.02.1991

(21) Application No 9014740.6

(22) Date of filing 03.07.1990

(30) Priority data

(31) 8915260

(32) 03.07.1989

(33) GB

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(51) INT CL^a

A63F 9/00 // A63F 9/04 9/18 9/22

(52) UK CL (Edition K)

A6H H10X27

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(58) Field of search

UK CL (Edition J) A6H H10X27 H16

INT CL^a A63F**(54) An electronic aid to game playing**

(57) An electronic device to aid in playing board games, comprises a central control and display unit (arbiter) 10 and a number of slave units (responders) 12 each held by one player. The arbiter has a keypad 32 with numeric keys and function keys for entering data which is recorded in a programmable microprocessor in the arbiter, and visual and audible indicating means 34. Among the capabilities of the device are: detection of the first player to answer a question; timing of answers to questions and controlling preset time limits, which may be set differently for each player; scoring functions; interpretation of data as to play in terms of teams of players in response to signals relating to individual players; and a "rotation" function for use in games played by turns. Each responder has a trigger switch 20 and a multi-function indicating lamp 22. The device may also be used as a random number indicator; it may also be connected to a video display unit such as a T.V. receiver.

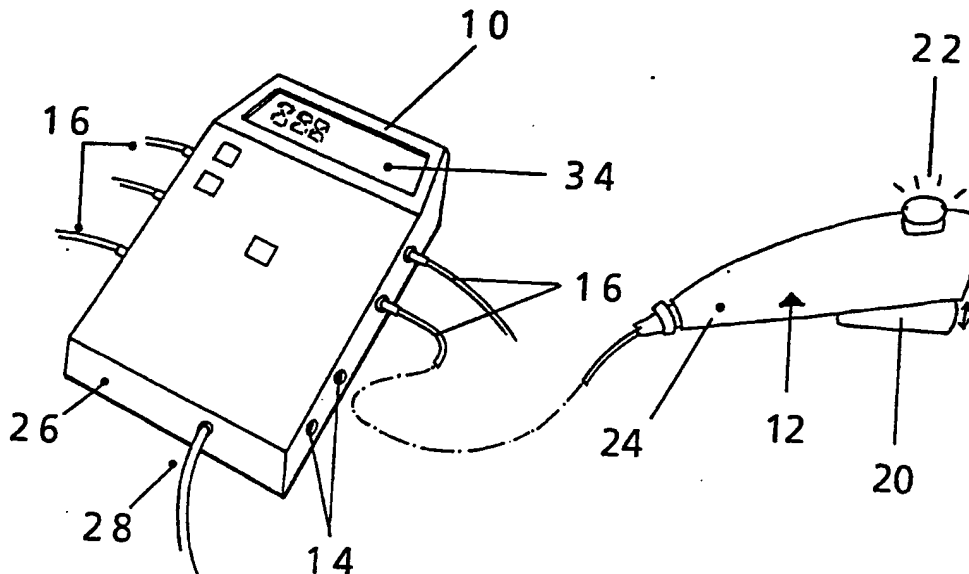
Fig. 1

Fig. 1

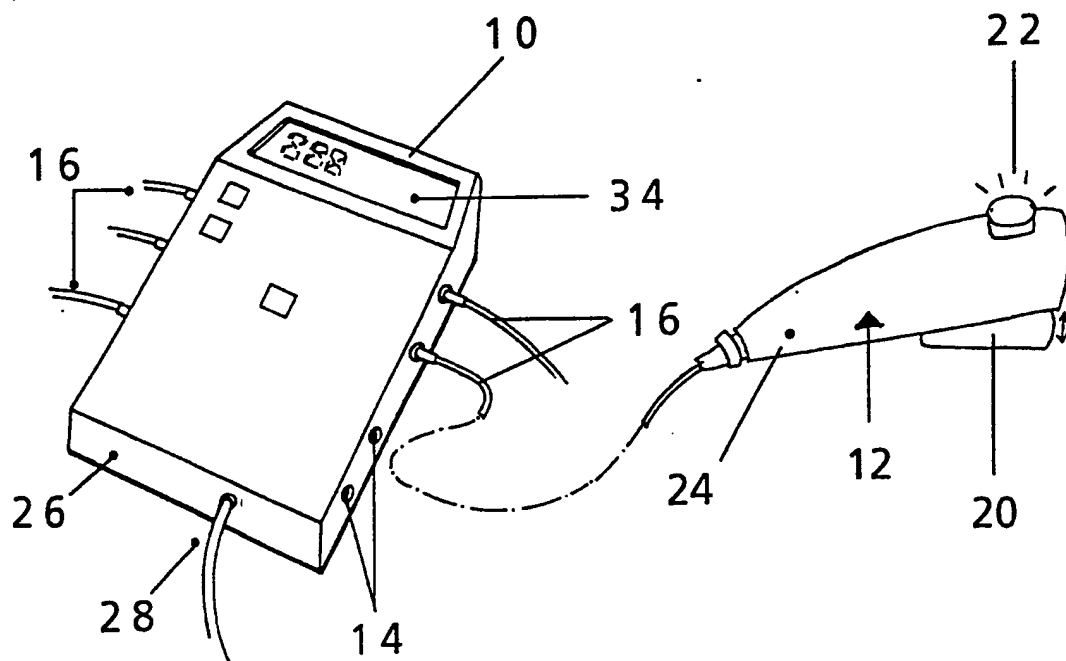
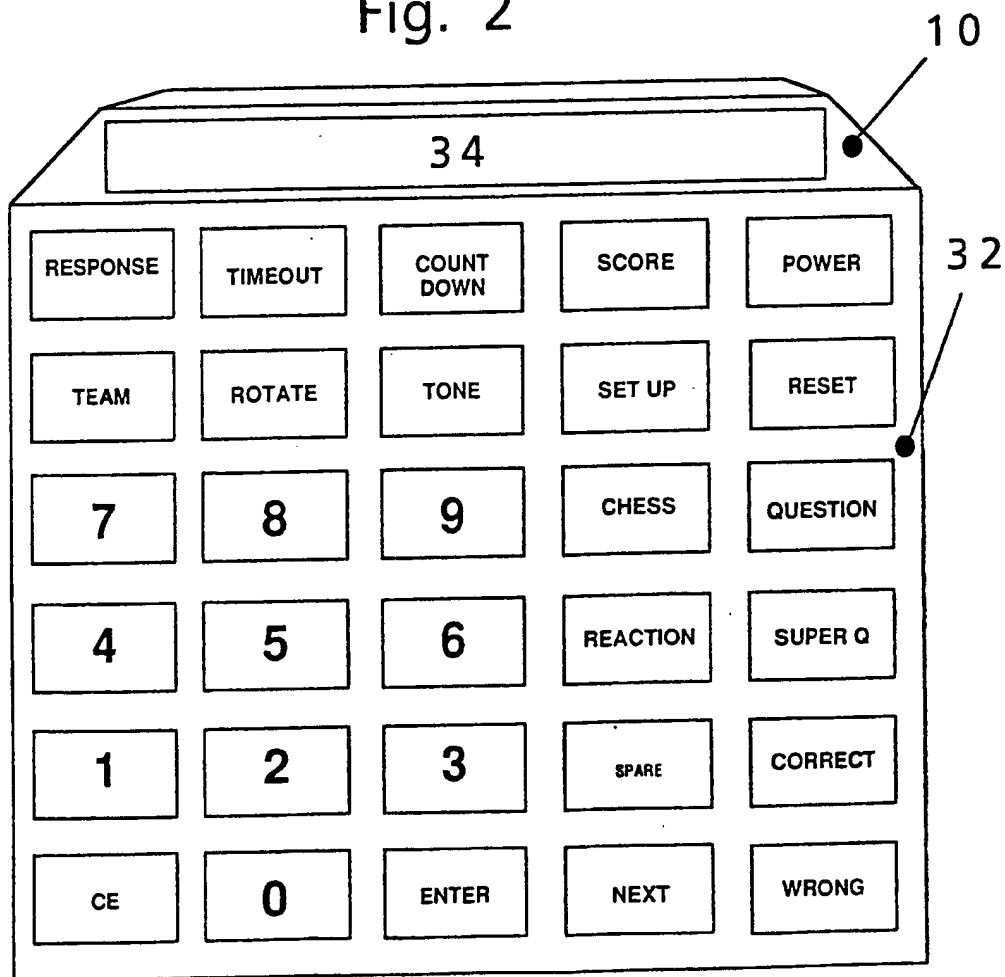


Fig. 2



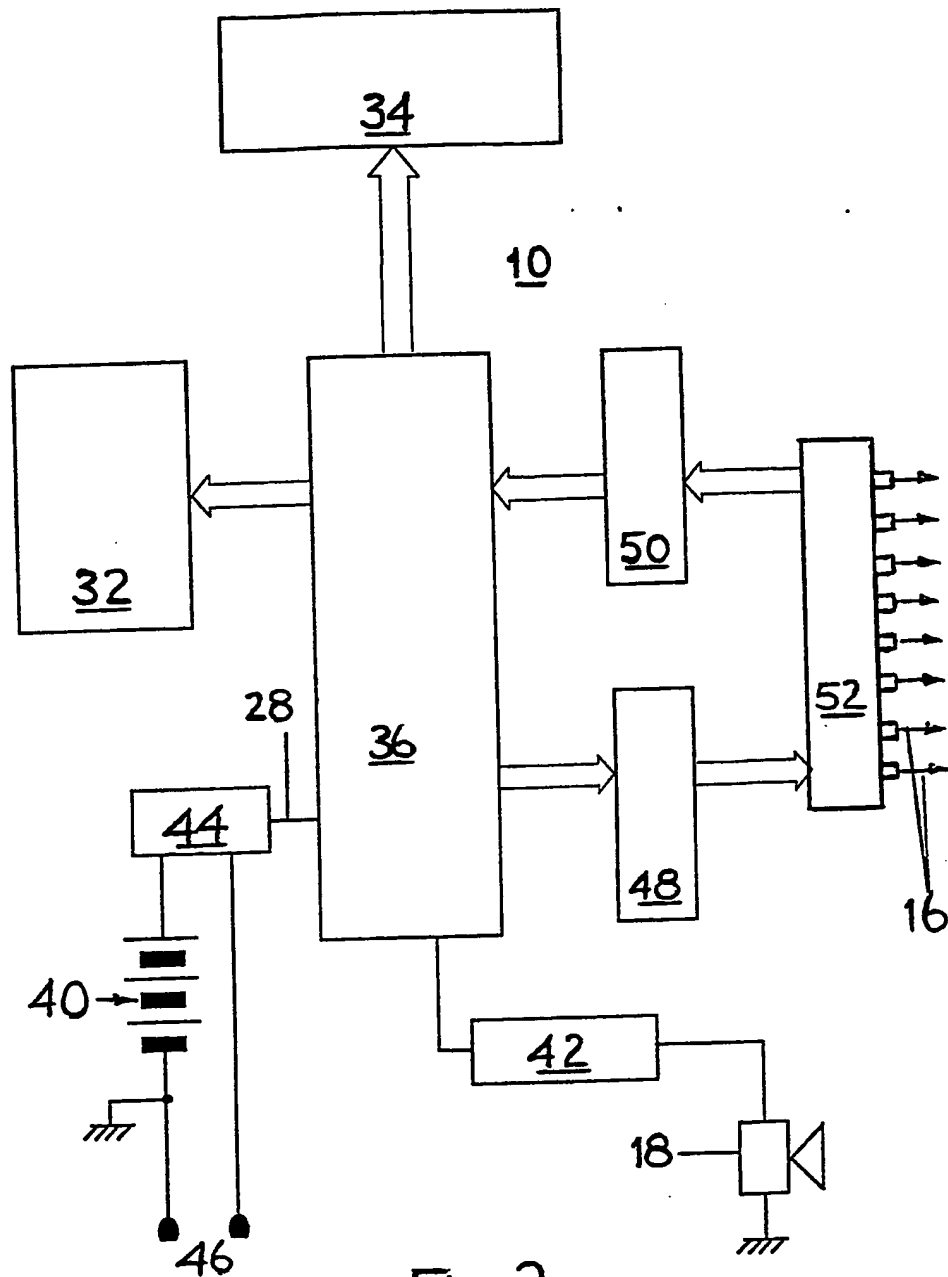





Fig 3

132

RESET	SETUP	NEXT	PLAY	SCORE	SPEAK
7	8	9	OFF	ON	
4	5	6	??	?	
1	2	3	(SPARE)	X	
0		C			

Legend:




	= time/timeout	?	= question
X	= wrong	??	= superquestion
	= correct		= dice throw

Fig 4

AN ELECTRONIC AID TO GAME PLAYING

This invention relates to electronic devices for use as an aid to the playing of games, especially but not exclusively board and similar games where judging of parameters such as time and score are required for each player or team of players.

The object is to provide a multi-functional device, versatile yet easy to use, for home use as an aid to playing most types of family games, such as quiz games, requiring scoring or timing of responses.

It is suitable for use either in conjunction with general knowledge quiz games such as BLOCKBUSTERS (Trade Mark), where it can detect who is first to answer a question; with other family or team games such as SCRABBLE (Trade Mark), where it can be used for both measuring the thinking time of a player, and/or keeping scores in its memory; or completely independently to provide a game in its own right. Examples of this last application, in which no additional special equipment such as boards, cards, counters etc. is required, are those known by the names (any or all of which may be Trade Marks) MASTERMIND, BEAT THE CLOCK, DICE THROW, and REACTION TIMER.

The device according to the invention comprises a central control and display unit, here called an arbiter, and a plurality of slave units called responders. Each player has a responder, and all the responders are connected to the arbiter and interact with it. The responders are typically hand-held, and the arbiter may be hand-held.

The arbiter comprises a microcomputer or microprocessor, a keypad, a display, an audible sound emitter, and supporting circuitry. Each responder comprises a switch device

(normally open), a lamp and a connecting lead, which plugs into the arbiter. In response to a question or other stimulus, any player may indicate a response by closing his responder switch, and this is detected by the arbiter. Depending on the mode selected, the arbiter may indicate its successful detection of the response by flashing on and off the indicator on the appropriate responder.

An electronic aid to game playing, in accordance with the invention, will now be described by way of example only and with reference to the accompanying drawings, in which:

Figure 1 is a simplified general view of the device;

Figure 2 shows the keypad and display of the arbiter in a first embodiment;

Figure 3 is a block diagram showing main circuits of the arbiter; and

Figure 4 is a view similar to Figure 2 but showing a modified arbiter keypad.

The arbiter 10, or control box, is a hand-held unit with any desired number of external sockets 14 (in this example there are eight), into each of which a plug on the free end of a respective responder lead 16 is fitted as required. Each lead 16 is connected to a responder 12, and each player has a responder, so that in this example up to eight players can participate. Only one responder is shown in Figure 1. Each responder 12 is intended for hand-held use by a respective player, and has a normally-open circuit breaker operated by a spring biased trigger 20, together with a single green lamp (LED) 22, mounted into a holder 24 designed to be easy to grip for lengthy periods. Each responder lead 16 is a built-in three-wire cable with the three wires providing earth, output to LED 22 from an

arbiter 10, and an input to the arbiter responsive to squeezing of the trigger 20. The triggers 20 of the various responders may be varied in colour so as to colour-code the responders. Each cable has a self-gripping plug for attachment to one of the sockets 14. For each responder, the output from the arbiter 10 is effective to illuminate or extinguish a single lamp 22, or to flash it on and off for a programmable time interval; while the output from the responder 12 (and thus the input to the arbiter) represents the state of the responder circuit breaker, which is either on (squeeze) or off (normal). The latter is designed to activate an output signal about halfway through the squeezing motion on the trigger 20.

Referring to Figures 1 and 3, the arbiter 10 has a power input lead 28 which is supplied with current via a voltage regulator 44, either from a mains supply via an external 6V transformer and rectifier (not shown) connected to d.c. power input terminals 46, or from a battery 40 in the arbiter casing. The lead 28 is connected to the input of a 4-bit, masked ROM, microprocessor 36 (Figure 3), in the form of a single chip, in the arbiter. The microprocessor 36 provides all the processing, input and output, timing and program capacity that may be required. The microprocessor 36 controls, through a driver circuit 42, an audible tone emitter 18, which is configured with the control unit 10, i.e. built-in, with six or more programmable tones, each providing a variable time interval of continuous sound. The sound from the emitter must be loud enough to be heard by all participants, and may be associated with a loudspeaker as shown.

The front of the casing 26 carries a generally conventional calculator-type keypad 32, Figure 2, or 132, Figure 4, and a liquid crystal display (LCD) 34. The keypad comprises a

numeric pad together with a number of function keys. The LCD 34 requires eight numeric positions, each of which can also display certain letters and a decimal point. Each segment of the seven-segment display is independently programmable.

Both the keypad 32 and the LCD 34 are controlled directly by the microprocessor 36. The latter is also connected, via suitable responder input driver circuits 48 and responder output buffer circuits 50, with a responder interface 52 to which the responder leads 16 are connected.

The microprocessor 36 embodies suitable software such as to use the hardware configuration to provide any one or more, and preferably all, of the following capabilities:

CAPABILITIES

- (1) Detecting who is first to squeeze a responder trigger 20 after receipt by the microprocessor of a first input signal, which is given either when a question is asked, or when a stimulus is automatically generated, e.g. lighting the lamp 22.
- (2) Queuing of multiple responses to any given question in the same order in which the respective triggers 20 are squeezed.
- (3) Controlling the visual indicating means (in this example lamp 22) of each responder 12. Each lamp has three modes, namely an on mode in which it is continuously illuminated; a flashing mode; and an off mode. These modes apply, for example, under the following general circumstances for the appropriate player:

first to respond	(flashing mode)
no response	(off mode)
queued but not first	(on mode)

- (4) Sounding the audible emitter 18, the six tones of which represent the following events:

<u>Event</u>	<u>Tone</u>
question start	- bip
correct reply	- beep
incorrect reply	- boop
"timeout"	- honk
"superquestion" start	- zap
nearing end of timeout	- zing (repeated
during play of BEAT	every second for
THE CLOCK (Trade Mark)	at least 5 seconds)

The emitter 18 can also be arranged in any known manner to provide for more complex signals if needed.

- (5) Three programmable timeout periods, comprising:
- (a) the time interval from the end of a question to the first actuation of a responder;
 - (b) the time interval allowed for a responder to give a correct reply;
 - (c) the time interval for multiple questions in a BEAT THE CLOCK type quiz.

These timeout periods can be "personalised" into the unit 10 to the nearest second as required for the game being played. They may differ in length from each other: e.g. 5 seconds for a question timeout or 10 seconds for a response timeout. In the case of a game

such as SCRABBLE (Trade Mark), the response timeout (b) can be set to a much longer period, e.g. 250 seconds, and there would be no question timeout (a). The "thinking" times are also accumulated for each player or team and can be displayed on demand at any time by the LCD 34.

- (6) Scoring functions which support any or all of the following:
 - (a) automatic addition of a pre-defined mark to the accumulating score for each player, e.g. 3 points;
 - (b) an option for a second higher automatic mark, also pre-defined, for a "super-question";
 - (c) a score keyed in on the control unit 10 after each response, e.g. 53 points for a SCRABBLE word;
 - (d) the display of scores on demand at any time by the LCD 34; and
 - (e) an option to deduct a pre-defined mark for a wrong answer if required, with a higher deduction for a "super-question".
- (7) A "team function", which permits the pre-definition of teams whose team members' scores are automatically combined. The teams may have different or the same numbers of members, which are registered in the control unit 10 by the process of "personalisation", described later herein, before the game begins. Examples are four teams of 2, two teams of 4, one player versus the rest, 5 versus 3, and so on.

When such a team option is defined, actuation of the first responder 12 in the team causes all the LEDs 22

of the other responders in that team to flash. Also the queuing mechanism queues only the first responder from each team, not individual responders. The accumulation of thinking time is also arranged to be on a team basis in this case.

- (8) A "time limit" option, for setting an overall or global timeout which measures a pre-defined time interval, e.g. 120 seconds, during which the responder must record the answers to as many questions as possible.
- (9) For games not requiring the use of the responders (e.g. SCRABBLE), the control unit 10 automatically scans the responders in succession, in order to deduce who is currently thinking. The next score keyed in will be assumed to be for the current player, unless this function is specifically over-ridden.

Detailed programs to constitute this software need not be given here as they can be evolved using conventional programming techniques. However, certain basic functions of the software will be discussed in the sixteen specific numbered examples to be described below.

It is to be clearly understood that the equipment shown in Figures 1 to 3 and described above may take any desired form. For example the responder leads 16 may be connected into the back of the case instead of at the sides. The arbiter unit can be arranged to be supported in any required way, e.g. on a table instead of being hand held. Preferably it is made heavy enough to lie on a table during a game without being at risk of being swept off the table either when touched to press the keys, or when a responder lead is

pulled inadvertently (for instance if a player stands up suddenly). The software described above is also by way of non-limiting example only.

Figure 5 shows an arbiter keypad 132 in a layout in which function keys are marked variously with the legends or symbols the functions of which will be self-explanatory from this description when read in conjunction with the Figure.

In this connection, some very specific (and again entirely non-limiting) examples of basic functions of the software will now be discussed with reference to Figure 2, in which the keys referred to are indicated by appropriate legends in the keypad 32. These legends, the number of keys, and the key sequences and descriptions or definitions of "user interface" functions appearing in the following examples, can of course be varied at will, and/or supplemented by other legends, keys, key sequences and user interface functions, as required for assisting the playing of different games, all within the scope of the invention.

Many of the functions described in the examples are possible with the keypad 132 of Figure 5.

EXAMPLES

1. PERSONALISATION

The microprocessor 36 and the software are such that at least the parameters discussed below can be personalised, i.e. set to predetermined values appropriate to individual players or teams. This can be done between each game and the next, though in a mains-powered system having a back-up battery, or in a purely battery-powered system, the arbiter 10 can be arranged to retain the last-used personalisations even when mains power is turned off. The SET UP key is used to prefix all these personalisation entries. Several commonly used settings can also be held permanently if desired, for copying into the RAM 36. Figure 3, when selected.

Timeout Constants

The timeout constants are:

- (a) Maximum number of seconds from question to first response.
- (b) Maximum number of seconds for responder to reply.
- (c) Time period for "time limit" function.

All values can be in the range 0 to 999 seconds. Zero is interpreted as infinity (i.e. no time limit). Default values are all zero (no timeouts).

To set up the respective timeout constant (a), (b) or (c), the keys are pressed in the following sequence, where "nnn" represents the appropriate numeric entry of up to three digits:

- (a) SET UP TIMEOUT nnn ENTER
- (b) SET UP TIMEOUT TIMEOUT nnn ENTER
- (c) SET UP TIMEOUT TIMEOUT TIMEOUT nnn ENTER

With tactile keying, multiple presses of the same key are performed by holding the key down for the correct number of "clicks". Each click represents half a second.

Definition of team members

Teams are defined at the beginning of a game, or series of games, by pressing the responder triggers 20 when prompted to do so by the arbiter. Each set of triggers defines the corresponding team, which is then remembered until changed or until power is lost.

Scoring

Scoring points are personalised by specifying four parameters:

- (A) Correct answer to Normal question = nnn e.g. 5 marks
- (B) Wrong answer to Normal question = nnn e.g. 0 marks
- (C) Correct answer to Superquestion = nnn e.g. 10 marks
- (D) Wrong answer to Superquestion = nnn e.g. 3 marks
(interpreted as
minus 3 marks)

Any leading zeros on "nnn" need not be entered. Defaults are 1, 0, 1, 0, i.e. there is no penalty for wrong answers, and there are no superquestions. Any non-zero value keyed against a wrong answer is assumed to be negative. The respective keying sequences for the above four parameters is as follows:

(A) SET UP CORRECT QUESTION nnn ENTER
 (B) SET UP WRONG QUESTION nnn ENTER
 (C) SET UP CORRECT SUPER Q nnn ENTER
 (D) SET UP WRONG SUPER Q nnn ENTER

Sequence in a rotational game

Where the game does not involve use of responders but is rotational, e.g. SCRABBLE, the control unit is personalised for the rotation sequences by keying as follows:

SET UP ROTATE 2 4 6 1 5 ENTER

In this example, five players are playing in the order 2, 4, 6, 1, 5. Default is 1, 2, 3, 4, 5, 6, 7, 8.

However, since responders would not be utilised in this case, it would be more usual simply to use this keying mode to identify the number of players in sequence: for example:

SET UP ROTATE 1 2 3 4 5 ENTER

Where responders are in use, it is easy to identify who is holding which responder, by asking each player to squeeze in turn, and then look at the response queue (described below). This avoids having to trace each cable visually to its socket in order to identify a responder.

2. MEMORY RESET

A single depression of the RESET key causes all responder lamps 22 to be extinguished, the LCD 34 to display zero, the emitter 18 to be silenced, and the queue (if any) to be cleared of waiting responders. Depression of the RESET key twice within 1 second causes, in addition to above, all

scores to be cleared to zero. If the RESET key is pressed three times within two seconds, all of the events resulting from depression of the key twice will take place. This has the additional effect that all personalisations are reset to their default values, in which: timeouts are indefinite; there is no active "time limit" function; there are no teams, each responder instead competing individually; and scoring points are 1, 0, 1, 0 for correct question, wrong answer, correct answer to a superquestion, wrong answer to a superquestion, in that order.

3. ASKING A QUESTION

When a question has been asked, or it is someone else's turn to start thinking, the questioner presses the QUESTION key or SUPER Q key on its own. This causes:

- (a) extinguishing of all responder lamps;
- (b) display of question marks by LCD;
- (c) commencement of timeout to first response;
- (d) commencement of scanning of responders, so as to detect which player answers first, and subsequent later attempts to respond (this has no harmful effect if responders are either not in use or not connected); and
- (e) selection of the correct or wrong mark to be added to, or subtracted from, the score.

The SUPER Q key need only be used for the higher mark if there are two differing marks.

4. DETECTION AND QUEUING OF RESPONSES

When a player thinks he knows the answer to a question he simply squeezes the trigger 20 of his responder.

If he is the first to squeeze, a letter A - H signifying his team, and his team's current score accumulation, appears on the LCD 34, and his green LED 22 flashes. In team games, his LED would also flash if another member of his team were the first to squeeze his trigger. Other players who are not the first to squeeze their triggers are queued into memory: they will be needed if the first responder answers the question wrongly.

Also these responders who were queued, but not the first, would show a continuously illuminated green lamp 22. This helps confirm to a player, who may not easily be able to see the control unit LCD 34, that he has been detected and queued, but is not first. Non-responding players' green lamps would remain unlit, unless they were members of teams who had responded.

If any player squeezes twice or more, either accidentally or intentionally, only the first squeeze registers, others being ignored by the software.

5. TIMEOUTS ON QUESTION AND RESPONSE

If timeouts have been personalised (default is none), then an audible tone is emitted after the specified number of seconds if nobody responds to a question. "Honk" is the timeout tone. If any player squeezes before the timeout, the timeout measurement immediately ceases; but if any player squeezes after the timeout, his squeeze is ignored by the software and his responder lamp stays off.

A second timeout (response timeout) commences when the

questioner keys the RESPONSE key, Figure 2, or the SPEAK key, Figure 5. This he does after having informed the first player that he is entitled to answer. This player now has the personalised number of seconds in which to respond. If no response timeout has been set up (default is none) then there is no need to use the RESPONSE key as it serves no purpose.

If a player has timed out, i.e. failed to respond before the response timeout elapses, the "honk" tone sounds. The depression of the WRONG key then causes the following events to occur automatically.

- The player who timed out is removed, together with any members of his team, from the control unit display.
- The green lamp on the first responder is extinguished. If the game is a team game, the lamps of all the other members of the same team are extinguished.
- The green lamp on the second responder (No. 2 in the above example) changes from the on mode to the flashing mode. If the game is a team game, all other team members' lamps change from the on mode to the flashing mode.
- The green lamps on any other responders (or new responders if they are now squeezed), remain on, as do the responders of any other members of teams.
- The relevant wrong mark for QUESTION or SUPER Q is deducted from the score.

6. END OF RESPONSE

When a responding player has answered a question correctly within the time limit, the questioner presses the CORRECT key alone. This causes the following events to occur automatically.

- All responder lamps are extinguished.
- The queue is cleared in the memory and on the LCD.
- A mark is added to the score for the correct answer (QUESTION or SUPER Q as desired).

When a player is midway through answering a question when the timeout "honk" sounds, it is at the discretion of the questioner whether or not the answer, if correct, is to be accepted, depending upon agreed rules between the players. Either the CORRECT or the WRONG key may be pressed after the timeout "honk" in this case.

The WRONG key, whether used either before or after a timeout, causes the same events to occur as listed at the end of 5 above.

After a wrong answer, and if another responder has been queued, the questioner presses the NEXT key. The NEXT key causes the response timeout to restart after the questioner has informed the next queued player that he may now answer the question. After a correct answer, or after a wrong answer when no one else is queued to respond, the questioner now asks the next question and presses the QUESTION key or SUPER Q key again.

7. SCORING

Scores can be entered manually after each question or event, or use can be made of the automatic addition/deduction of previously personalised marks, as described in 1 above under "Scoring".

If automatic scoring is in use, then the CORRECT and WRONG keys, together with the initial use of the QUESTION key or the SUPER Q key, define the four possible actions to be taken: i.e.

- correct question adds A marks
- correct "super question" adds B marks
- wrong answer to question subtracts C marks
- wrong answer to "super question" subtracts D marks

With manual scoring, the following key sequences define the mark nnn to be added or subtracted:-

m	CORRECT	nnn	SCORE
m	WRONG	nnn	SCORE

where "m" represents the serial number of the team, or the individual (Nos. 1 - 8) if teams are not in use. It may be omitted if the "Rotation" option is in use. The correct player is of course already displayed in the LCD 34.

8. DISPLAY OF SCORES AND THINKING TIME

Any score can be displayed at any time by keying:

m SCORE, where

"m" defines the individual (Nos. 1 - 8) or the team.

The display shows accumulating thinking time in seconds, followed by the score (four digits each).

9. DISPLAY OF QUEUE

The current responder queue can be displayed at any time by keying:

0 SCORE

This information is usually already on display whilst play is in progress, but may have been over-written by other functions and therefore need to be redisplayed.

10. TEAM GAMES

Personalisation of members of teams is described in 1 above. When games are being played by teams, it is assumed that a wrong response by one team would result in another team being given an opportunity to respond, to the exclusion of any other member of the first team that gave the wrong response. With this in mind, the following rules apply.

- The green lights of all members in a given team remain flashing when the first responder or the current responder is in that team.
- Any attempt by another member of the same team to operate his responder 12 is ignored.
- The queue of responders can never be larger than the number of teams.
- All team members' green lights are set in the on mode if any member of the team is queued but is not first, and the current first in queue is not in this team.

- Scores are kept and displayed on a team basis rather than an individual basis.

The members of a team, and the team number, can be displayed using the keying sequence:

m TEAM

where "m" is the team number (from 1 to a maximum of 7).

The display 34 shows, for example, 3 124 where team 3 comprises players 1, 2 and 4. The team members are always displayed in numerical sequence. The extreme case of 7 players versus 1 player would use all eight display positions. For example, a display of 2, 1, 2, 3, 5, 6, 7, 8 means that player 4 is in team 1, versus Nos. 1, 2, 3, 5, 6, 7, 8 in team 2.

11. TIME LIMIT FUNCTION

Pressing the TIMEOUT key alone starts a clock (not shown), which remains active regardless of any other key depressions or use of responders. The elapsed clock time is as personalised in 1 above, under "Timeout Constants" at (c).

The questioner may now ask as many questions as he can during the clock countdown. When approaching the end of the countdown the audible tone "zing" (default) sounds for 1/2 second at the commencement of each of the last 5 seconds. The final "zing" is followed by a "honk" (default for end of timeout).

This time limit or "beat the clock" function can also be used as an alternative to the response timeout when playing games such as SCRABBLE. It also operates independently of, yet simultaneously with, all other functions which could

sensibly operate concurrently, such as scoring, responding, queuing, and the other two timeouts which can overlap or fall within the clock timeout.

12. LIST OF AUDIBLE SOUNDS FROM ARBITER 10

Number	Sound	Default Use
1	BIP	on depression of QUESTION key
2	BEEP	on depression of CORRECT key
3	BOOP	on depression of WRONG key
4	HONK	at end of all timeouts
5	ZAP	on depression of SUPER Q key
6	ZING	countdown clock, last 5 seconds

13. RESPONDER LAMP INDICATIONS

In each mode of a responder lamp, the indications given (more specifically than as described above in the discussion of the software capabilities) are as follows:

OFF	=	trigger has not been squeezed, either at this responder or at that of any other member of the same team
FLASHING	=	this is currently the first responder in the queue, or this player's team is first in the queue
ON	=	this individual player (or a member of the same team) has responded but is not yet the first to respond

14. ROTATIONAL PLAY

Once a rotation sequence has been personalised as described in 1 above, and provided that no responders are squeezed, the control unit 10 will automatically remember and display the next player in rotation while he is thinking. In this mode the usual responder queue display is replaced by a single digit display, which rotates to the next after each score is manually entered, or after the CORRECT or WRONG keys are used to add or deduct an automatic score.

An additional feature in rotational play is the continual display of the current score for the player currently thinking, together with his thinking time for the current questions. For example, if the display is:

4 396 73

then this signifies that player No. 4 is currently thinking: that his previously accumulated score is 396; and that he has spent 73 seconds thinking about his current question (counting upwards every second).

15. KEYBOARD FUNCTIONS

The functions of all the keys on the keypad will be clear from the foregoing, with the exception of:

the CE key, Figure 2, or the C key, Figure 5, which clears errors whilst keying if it is the terminating key and not the key pressed;

the POWER key, Figure 2, or the ON and OFF keys, Figure 5. These control power on/off to the battery or mains circuits;

and at least one optional spare key.

16. ERROR CONDITIONS

Among possible error conditions are the following.

- (i) Invalid keying sequences result in the display of zero and the sounding of a "zing" (default) tone.
- (ii) Use of responders when no question is pending, or their use twice for the same question, are ignored.
- (iii) If the NEXT key is pressed when there are no more responders in the queue, then the function performed is the same as when the RESET key is pressed once, as described in 2 above.
- (iv) Accidental operation of a trigger 20 can be cleared by the RESET key only if no other responders are queued.
- (v) Responders not plugged into a socket 14 do not cause any harm. They are treated similarly to responders which may be plugged in but which are not personalised to be playing or be part of a team.
- (vi) Players who opt out in mid-game will not affect the logic for games using responders. In rotational games these players can be identified and skipped over.
- (vii) Whilst power is on, the LCD 34 must always be displaying something and never be blank. If there is no meaningful display as a result of the last command, the display will be zero. Zero is also displayed when power is switched on, or after an error in keying a command, if there is no other more meaningful display.
- (viii) Any attempt at cheating by the questioner can be detected, since audible tones are used with any

keying sequence which can be used by the judge or questioner to favour any player to the detriment of others. Such keying sequences can be defined and protected by tones which all the players can hear.

(ix) If no key is pressed, nor a responder operated, during a period of one hour, the software can be arranged, in known manner, to disconnect the power supply automatically.

The device is susceptible to many modifications and additions within the scope of the invention. For example, a television adaptor may be provided, enabling the arbiter 10 to be connected to the input of a video display unit, such as a television receiver, via a suitable serial interface. A detailed continuous display of all scores, queues, accumulated thinking times, countdown clocks showing decreasing elapsed seconds on all timeouts, and full details of personalisation options selected, may then be displayed on the screen of the television receiver.

The device may be used as a reaction timer game, with responders 12 and the arbiter 10. In this mode, initiated by the REACTION key, Figure 2, responder lamps are lit at random by the arbiter and the response time is accurately measured for the person using that responder to press the trigger 20. Accumulated response times are kept for all players, the lowest being the winner after a predetermined number of seconds.

Options must be available to allow either player to display their respective time remaining to the nearest second. An audible "HONK" tone should sound when all time is used up.

Another possible use for the device is as a random number indicator, for example to take the place of dice. In this

mode, the spare key (now marked DICE for example, or with a "dice throw" symbol as in Figure 5) is pressed after keying in a digit. For example:

1 DICE gives a display of 1-6 with equal probability;

2 DICE gives a display of: 2 with $1/36$ probability, or
 3 with $2/36$ probability, or
 4 with $3/36$ probability, or
 5 with $4/36$ probability, or
 6 with $5/36$ probability, or
 7 with $6/36$ probability, or
 8 with $5/36$ probability, or
 9 with $4/36$ probability, or
 10 with $3/36$ probability, or
 11 with $2/36$ probability, or
 12 with $1/36$ probability;

3 DICE gives a display of 3-18 with correct probability;

9 DICE gives a display of 9-54 with correct probability.

Another variation allows the number of dice faces to be altered from 6 to a value keyed in by the player.

The device may be used to simulate the proprietary game MASTER MIND (Trade Mark). In this mode a random four-digit value will be created but kept hidden from the player. The value may also include letters or a space. The player then guesses value and position using the keypad and is marked accordingly. The number of attempts is counted and displayed when success is attained.

CLAIMS

1. An electronic apparatus for use as an aid to game playing, comprising a central control and display unit or arbiter and a plurality of slave units or responders, the arbiter including a programmable microprocessor, central data input means for supplying to the latter data relating to a game, central indicator means responsive to signals from the microprocessor for giving information on the state of play, and input and output means for connecting the microprocessor with the responders, each responder having a switch operable by a respective player to transmit input signals to the microprocessor, and responder indicator means responsive to output signals from the arbiter.
2. Apparatus according to Claim 1, wherein the central data input means is a keypad.
3. Apparatus according to Claim 1 or Claim 2, wherein the central indicator means comprises a visual display.
4. Apparatus according to Claim 3, wherein the central indicator means further comprises a sound generating device.
5. Apparatus according to Claim 4, wherein the microprocessor is arranged to cause the sound generating device to emit sounds having distinctly different characters to convey different meanings.
6. Apparatus according to any one of the preceding Claims, wherein each responder indicator means comprises a lamp.
7. Apparatus according to Claim 6, wherein the microprocessor is adapted to control each responder lamp to give indications selectively by assuming an on mode in which it is continuously illuminated, a flashing mode, and

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an off mode.

8. Apparatus according to any one of the preceding Claims, wherein each responder comprises a handset.

9. Apparatus according to any one of the preceding Claims, wherein the microprocessor is adapted to provide at least the capabilities hereinbefore specified as such.

10. Apparatus according to Claim 9, adapted to perform any or all of the functions hereinbefore described in the examples.

11. An electronic apparatus for use as an aid to game playing, constructed, arranged and adapted to operate substantially as hereinbefore described with reference to the accompanying drawings.

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